



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

November 10, 2011

Mr. Thomas P. Joyce  
President and Chief Nuclear Officer  
PSEG Nuclear LLC - N09  
P.O. Box 236  
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK GENERATING STATION - NRC INTEGRATED INSPECTION  
REPORT 05000354/2011004

Dear Mr. Joyce:

On September 30, 2011, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at the Hope Creek Generating Station. The enclosed inspection report documents the inspection results discussed on October 13, 2011, with Mr. Perry, Station Vice President, and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

The report documents two findings of very low safety significance (Green). One of the findings was determined to involve a violation of NRC requirements. Additionally, a licensee-identified violation, which was determined to be of very low safety significance, is listed in this report. However, because of their very low safety significance and because they were entered into your corrective action program (CAP), the NRC is treating these findings as non-cited violations (NCVs) consistent with Section 2.3.2.a of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Hope Creek Generating Station. In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the NRC Resident Inspector at the Hope Creek Generating Station.

In accordance with Title 10 of the Code of Federal Regulations (CFR) 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the

Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

A handwritten signature in black ink, appearing to read 'Arthur L. Burritt', with a long horizontal flourish extending to the right.

Arthur L. Burritt, Chief  
Reactor Projects Branch 3  
Division of Reactor Projects

Docket No: 50-354  
License No: NPF-57

Enclosure: Inspection Report 05000354/2011004  
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Arthur L. Burritt, Chief  
Reactor Projects Branch 3  
Division of Reactor Projects

Docket No: 50-354  
License No: NPF-57

Enclosure: Inspection Report 05000354/2011004  
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

Distribution w/encl:

W. Dean, RA (R1ORAMAIL Resource)  
D. Lew, DRA (R1ORAMAIL Resource)  
D. Roberts, DRP (R1DRPMAIL Resource)  
J. Clifford, DRP (R1DRPMAIL Resource)  
C. Miller, DRS (R1DRSMAIL Resource)  
P. Wilson, DRS (R1DRSMAIL Resource)  
A. Burritt, DRP  
L. Cline, DRP  
A. Turilin, DRP

R. Montgomery, DRP  
F. Bower, DRP, SRI  
A. Patel, DRP, RI  
K. McKenzie, DRP, OA  
M. Franke, RI OEDO  
RidsNrrPMHopeCreek Resource  
RidsNrrDorLI1-2 Resource  
ROPreports Resource

**SUNSI Review Complete: LC (Reviewer's Initials)**

**ML113140561**

DOCUMENT NAME: G:\DRP\BRANCH3\Inspection\Reports\Issued\2011 (ROP 12)\HC1104.docx

After declaring this document "An Official Agency Record" it **will** be released to the Public.

To receive a copy of this document, indicate in the box: "C" = Copy without attachment/enclosure "E" = Copy with attachment/enclosure "N" = No copy

OFFICE <i>mmt</i>	RI/DRP	RI/DRP	RI/DRS	RI/DRP
NAME	FBower/LC for	LCline/ LC	WSchmidt/WC for	ABurritt/ ALB
DATE	11/10/11	11/ 10/11	11/10/11	11/10/11
			Sect 1R15 Only	

OFFICIAL RECORD COPY

## U.S. NUCLEAR REGULATORY COMMISSION

## REGION I

Docket No: 50-354

License No: NPF-57

Report No: 05000354/2011004

Licensee: PSEG Nuclear LLC (PSEG)

Facility: Hope Creek Generating Station

Location: P.O. Box 236  
Hancocks Bridge, NJ 08038

Dates: July 1, 2011 through September 30, 2011

Inspectors: F. Bower, Senior Resident Inspector  
A. Patel, Acting Senior Resident Inspector  
J. Hawkins, Acting Resident Inspector  
J. Furia, Senior Health Physicist  
J. Schoppy, Senior Reactor Inspector  
P. Kaufman, Senior Reactor Inspector  
C. Douglas, Project Engineer

Approved By: Arthur L. Burritt, Chief  
Reactor Projects Branch 3  
Division of Reactor Projects

Enclosure

## TABLE OF CONTENTS

SUMMARY OF FINDINGS .....	3
REPORT DETAILS .....	5
1. REACTOR SAFETY .....	5
1R01 Adverse Weather Protection .....	5
1R04 Equipment Alignment .....	6
1R05 Fire Protection .....	7
1R06 Flood Protection Measures .....	8
1R11 Licensed Operator Requalification Program .....	9
1R12 Maintenance Effectiveness .....	9
1R13 Maintenance Risk Assessments and Emergent Work Control .....	12
1R15 Operability Evaluations .....	12
1R18 Plant Modifications .....	15
1R19 Post-Maintenance Testing .....	16
1R22 Surveillance Testing .....	16
1EP6 Drill Evaluation .....	17
2. RADIATION SAFETY .....	17
2RS1 Radiological Hazard Assessment and Exposure Controls .....	17
2RS2 Occupational As Low as Reasonably Achievable (ALARA) Planning & Controls .....	19
2RS3 In-Plant Airborne Radioactivity Control and Mitigation .....	19
4. OTHER ACTIVITIES.....	21
4OA1 Performance Indicator (PI) Verification.....	21
4OA2 Problem Identification and Resolution .....	21
4OA3 Event Follow-up .....	25
4OA5 Other Activities.....	27
ATTACHMENT: SUPPLEMENTAL INFORMATION.....	28
SUPPLEMENTAL INFORMATION.....	A-1
KEY POINTS OF CONTACT.....	A-1
LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED .....	A-1
LIST OF DOCUMENTS REVIEWED .....	A-2
LIST OF ACRONYMS .....	A-12

## SUMMARY OF FINDINGS

IR 05000354/2011004; 07/01/2011 - 09/30/2011; Hope Creek Generating Station; Maintenance Effectiveness and Operability Evaluations.

This report covers a three-month period of inspection by resident inspectors, and announced inspections by reactor engineers and a regional radiation specialist. Two Green findings were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). The cross-cutting aspect of a finding is determined using the guidance in IMC 0310, "Components Within the Cross-Cutting Areas." Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### Cornerstone: Initiating Events

- Green. A self-revealing finding was identified because of the PMOC did not drive sustainable improvements in the 00-K-107 service air compressor's reliability as required by PM program procedure WC-AA-111. Specifically, PSEG did not change the PM frequency of the degraded compressor outlet check valve (H0KA-0KAV-004) nor evaluate the use of materials less susceptible to corrosion after several recent performances of the 18-month PM found excessive corrosion and rust on the valve internals. Consequently, this check valve failed closed due to corrosion, tripped the air compressor, and caused a service and instrument air headers pressure transients followed by an automatic start of the EIAC. After the May 12, 2011, failure, PSEG refurbished H0KA-0KAV-004's internals with new carbon steel components and plans to replace the 00-K-107 and 10-K-107 compressors' outlet check valves with stainless steel valves that are less susceptible to corrosion (Orders 60097323 and 60097371).

This finding is more than minor because it was associated with the equipment performance attribute of the Initiating Events cornerstone and affected the cornerstone objective of limiting the likelihood of events that upset plant stability and challenge critical safety functions at power. Specifically, the failure to adequately maintain the degraded compressor outlet check valve in the service air header increased the likelihood of a plant trip. The inspectors evaluated this finding using IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," Table 4a, and determined the finding to be of very low safety significance (Green) because the finding does not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment would not be available. The finding has a cross-cutting aspect in the area of human performance, work control component; because PSEG did not appropriately coordinate work activities by incorporating actions to ensure that maintenance scheduling is more preventive than reactive. Specifically, PSEG did not implement a recommended increase (PCR 80101517) in the frequency of a PM for H0KA-0KAV-004 before the valve failed shut and required reactive maintenance following a trip of the 00-K-107 air compressor. (H.3(b)) (Section 1R12)

## Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion III, "Design Control," in that, PSEG did not ensure the adequacy of the high pressure coolant injection (HPCI) design under post-accident conditions. Specifically, PSEG did not evaluate the impact of elevated temperature in the HPCI room on the operability of the HPCI system during a postulated design basis small break loss of coolant accident (SBLOCA) coincident with a loss of offsite power (LOOP) and a single failure of the A emergency diesel generator (EDG). PSEG determined through subsequent evaluation that HPCI was operable but non-conforming because there was a potential for HPCI system to isolate unnecessarily on high differential temperature during the extreme winter low temperatures. PSEG plans to implement a design change to reduce the setpoints of the HPCI room coolers so that the initial HPCI room temperature is maintained at a lower temperature before extreme winter conditions. The violation was entered into the CAP as notifications 20518124 and 20520106.

The performance deficiency was more than minor because it was associated with the design control attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. Specifically, PSEG had not evaluated HPCI operability using actual HPCI room temperatures during normal operating conditions, and as a result, HPCI's reliability during the most limiting accident conditions was not assured during extreme winter low temperatures. The inspectors reviewed this condition using IMC 0609, Attachment 4, and in consultation with a Region I senior reactor analyst (SRA), concluded that this issue screened to very low safety significance (Green). The finding had a cross-cutting aspect in the area of problem identification and resolution, corrective action component, because PSEG did not thoroughly evaluate a prior problem such that the problem resolution addressed the causes and the extent of condition. Specifically, PSEG's evaluation for notification 20381041, HPCI Operability During Station Blackout (SBO) Conditions, did not identify the impact of the actual initial HPCI room temperature on other accident conditions, such as a SBLOCA and LOOP with the single failure of an EDG and, therefore, did not identify that the actual HPCI room temperature was beyond the HPCI design document assumption that temperature should be between 60°F and 100°F. (P.1(c)) (Section 1R15)

## Other Findings

A violation of very low safety significance identified by PSEG was reviewed by the inspectors. Corrective actions taken or planned by PSEG have been entered into PSEG's corrective action program. This violation and corrective action tracking number are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

The Hope Creek Generating Station operated at or near full rated thermal power (RTP) for the duration of the inspection period with the following exceptions. On selected occasions required by atmospheric conditions, reactor power was reduced in small increments to clear condenser vacuum concerns and then subsequently returned to full RTP when atmospheric conditions allowed. On July 22, 2011, operators performed an unplanned power reduction from 94 percent to 80 percent RTP in response to increasing temperatures in the station auxiliary cooling system that was caused by grassing in the station service water (SW) system. The grassing issue was cleared and reactor power was increased the same day to the limits allowed by condenser vacuum. On September 9, 2011, a planned power reduction to approximately 76 percent RTP was conducted to support turbine valve testing, control rod scram time testing and a control rod pattern sequence change. The reactor was returned to full RTP on September 10, 2011, and the reactor remained near or at full RTP for the remainder of the inspection period.

### 1. REACTOR SAFETY

#### **Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, and Emergency Preparedness**

1R01 Adverse Weather Protection (71111.01 - 1 Imminent sample, 1 Ext Fld sample)

#### .1 Readiness for Impending Adverse Weather Conditions

##### a. Inspection Scope

The inspectors completed one impending adverse weather preparation sample. The inspectors reviewed PSEG's preparations for the onset of hot weather on July 12, 2011. The inspectors reviewed the implementation of adverse weather preparation procedures before the onset of and during adverse weather conditions. The inspectors walked down the EDGs and station service water (SW) to ensure system availability. The inspectors verified that operator actions defined in PSEG's adverse weather procedure maintained the readiness of essential systems. The inspectors discussed readiness and staff availability for adverse weather response with operations and work control personnel. Documents reviewed are listed in the Attachment.

##### b. Findings

No findings were identified.

#### .2 Readiness to Cope with External Flooding

##### a. Inspection Scope

During September 2011, the inspectors performed an inspection of the external flood protection measures for Hope Creek. The inspectors reviewed the updated final safety analysis report (UFSAR) Chapters 2.4.2, "Floods," and 3.4, "Water Level (Flood) Design," which depicted the design flood levels and protection areas containing safety-



related equipment to identify areas that may be affected by flooding. The inspectors also reviewed the limiting conditions for operations and the surveillance requirements in technical specification (TS) 3/4.7.3, "Flood Protection." The review was focused on the power block flood doors listed in TS Table 3.7.3-1, "Perimeter Flood Doors." The inspectors reviewed the PM activities performed on these doors with the responsible system engineer. The inspectors also conducted a walkdown of the accessible portions of all these doors with the responsible system engineer to verify that the doors were in conformance with the design basis requirements in the UFSAR, the TS, and plant procedures and drawings. Additionally, the inspectors reviewed the abnormal operating procedure, HC.OP-AB.MISC-0001, "Acts of Nature," for mitigating external flooding during severe weather to determine if PSEG had planned and established adequate measures to protect against external flooding events. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04 - 2 samples; 71111.04S - 1 sample)

.1 Partial Walkdowns

a. Inspection Scope

The inspectors completed two partial walkdown inspection samples. The inspectors performed partial system walkdowns for the systems listed below to verify each system's operability when redundant or diverse trains and components were inoperable. The inspectors completed walkdowns to determine whether there were discrepancies in the system's alignment that could impact the function of the system, and therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, walked down system components, and verified that selected breakers, valves, and support equipment were in the correct position to support system operation. The inspectors also verified that PSEG had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the CAP. Documents reviewed are listed in the Attachment.

- C residual heat removal (RHR) pump while D RHR out-of-service on July 26
- B, C, D EDG while A EDG out-of-service on August 2

b. Findings

No findings were identified.

.2 Complete Walkdown

a. Inspection Scope

The inspectors performed one complete walkdown inspection of the A EDG. The inspectors used PSEG procedures and other documents to verify proper system alignment and functional capability. The inspectors independently verified the alignment

and status of the A EDG system breakers, valves, switches, and associated support systems. The walkdown also included checks that fuel oil levels were normal, system parameters were within established ranges, and equipment deficiencies were appropriately identified and entered into the CAP for resolution. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05Q - 5 samples; 71111.05A - 1 sample)

.1 Fire Protection - Tours

a. Inspection Scope

The inspectors completed five quarterly fire protection inspection samples. The inspectors conducted tours of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that combustibles and ignition sources were controlled in accordance with PSEG's administrative procedures; fire detection and suppression equipment was available for use; that passive fire barriers were maintained in good material condition; and that compensatory measures for out of service, degraded, or inoperable fire protection equipment were implemented in accordance with PSEG's fire plan. The areas toured are listed below with their associated pre-fire plan designator. Documents reviewed are listed in the Attachment.

- FRH-II-532, lower relay room
- FRH-II-412, reactor core isolation cooling pump room
- FRH-II-413, HPCI pump room
- FRH-II-433, A&C safety auxiliary cooling system (SACS) pump room
- FRH-II-432, B&D SACS pump room

b. Findings

No findings were identified.

.2 Fire Protection - Drill Observation

a. Inspection Scope

The inspectors observed an unannounced fire brigade drill scenario conducted on August 7, 2011, that involved a simulated electrical fire in the D 1E Switchgear Room on the 130' elevation in the diesel generator area of the Auxiliary Building. The inspectors also observed the participation of the operators in the main control room. The inspectors evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified that PSEG personnel identified deficiencies, openly discussed them in a self-critical manner during post-drill critique activities, and took appropriate corrective actions as required. The inspectors evaluated specific attributes as follows:

- Proper wearing of turnout gear and self-contained breathing apparatus
- Proper use and layout of fire hoses
- Employment of appropriate fire-fighting techniques
- Sufficient fire-fighting equipment brought to the scene
- Effectiveness of command and control
- Search for victims and propagation of the fire into other plant areas
- Ventilation control and smoke removal operations
- Utilization of pre-planned strategies
- Adherence to the pre-planned drill scenario
- Drill objectives met

The inspectors also evaluated the fire brigade's actions to determine whether these actions were in accordance with PSEG's pre-fire plans and fire-fighting strategies. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 - 1 Int Fld sample)

Internal Flooding Review

a. Inspection Scope

The inspectors completed one flood protection measures inspection sample. The inspectors reviewed selected risk-important plant design features and PSEG procedures intended to protect the plant and its safety-related equipment from internal flooding events. Specifically, the inspectors focused on internal flood mitigation features for the 130' elevation of the auxiliary building, which contains class 1E switchgear, breakers, and control panels for all four EDGs. The inspectors reviewed flood analysis and design documents, including the UFSAR, engineering calculations, and abnormal operating procedures. The inspectors observed the condition of wall penetrations, watertight doors, flood alarm switches, and drains to assess their readiness to contain flow from an internal flood in accordance with the design basis. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification Program (71111.11Q - 1 sample)

a. Inspection Scope

On August 15, 2011, the inspectors completed one quarterly licensed operator regualification program inspection sample. The inspectors observed operators in the plant's simulator during licensed operator regualification training to verify that operator performance was adequate and that evaluators were identifying and documenting crew performance problems. The inspectors also verified that performance errors were

discussed in the crew's post-scenario critiques. The inspectors focused on the control room supervisor's satisfactory completion of critical tasks. The inspectors also observed operator implementation of abnormal and emergency operating procedures. The inspectors discussed the training, simulator scenarios, and critiques with the operators, shift supervision, and the training instructors. Documents reviewed are listed in the Attachment. The simulated events observed during this one scenario are listed below:

- Recirculation pump trip;
- Fuel cladding failure; and
- A stuck open safety/relief valve (SRV).

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q - 1 samples)

a. Inspection Scope

The inspectors completed one maintenance effectiveness inspection sample. For the equipment performance issue listed below, the inspectors evaluated items such as: appropriate work practices; identifying and addressing common cause failures; scoping in accordance with 10 CFR 50.65(b) of the Maintenance Rule; characterizing reliability issues for performance; classification and reclassification in accordance with 10 CFR 50.54(a)(1) or (a)(2); and appropriateness of performance criteria for structures, systems, and components (SSCs)/functions classified as (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSCs/functions classified as (a)(1). Documents reviewed are listed in the Attachment.

- Service air compressor failures

b. Findings

Introduction. A self-revealing finding was identified because of the PMOC did not drive sustainable improvements in the 00-K-107 service air compressor's reliability as required by PM program procedure WC-AA-111. Specifically, PSEG did not change the PM frequency of the degraded compressor outlet check valve (H0KA-0KAV-004) nor evaluate the use of materials less susceptible to corrosion after several recent performances of the 18-month PM found excessive corrosion and rust on the valve internals. Consequently, this check valve failed closed due to corrosion, tripped the air compressor, and caused a service and instrument air headers pressure transients followed by an automatic start of the EIAC.

Description. Hope Creek has two 100 percent capacity service air compressors (00-K-107 and 10-K-107). The service air compressors are not safety-related, but are important to safety because they supply instrument air header pressure. A loss of instrument air at Hope Creek can cause an automatic scram by affecting control rod movement and/or spurious feedwater and condensate system valve operation. The service air compressors are each operated 50 percent of the time and normally swapped every 18 months to minimize cycling and to conduct PM.

On May 12, 2011, PSEG conducted a planned swap from the 10-K-107 service air compressor to the 00-K-107 service air compressor. During the swap, service and instrument air header pressures dropped unexpectedly from approximately 100 psig to 84 and 81 psig, respectively, and when the 10-K-107 service air compressor was stopped the 00-K-107 service air compressor tripped on high discharge pressure. Lowering air pressure (<85 psig) at the emergency instrument air receiver resulted in the automatic start of the emergency instrument air compressor (EIAC) and entry into abnormal operating procedure HC.OP-AB.COMP-0001. The EIAC promptly restored service and instrument air header pressures to normal.

PSEG determined that the cause of the instrument and air system transient was that the outlet check valve (H0KA-0KAV-004) for the 00-K-107 service air compressor was corroded shut. PSEG concluded that H0KA-0KAV-004 was corroded because it was located upstream of the system air dryers and the valve internals were carbon steel. PSEG noted in its cause evaluation that, due to the wetted environment it was exposed to, they had previously considered modifying H0KA-0KAV-004 by replacing the carbon steel internals with stainless steel. However, to date, no engineering change request was submitted to initiate the modification process for this material change.

Based on a review of the PM program, the inspectors determined that vendor documents for the H0KA-0KAV-004 recommend at least an every two-year open and inspect PM, but after the valve was found corroded shut in May 2002, PSEG had increased the inspection frequency to every six months. In April 2004, PSEG changed the PM frequency from every six months to every 18 months. The basis for the change was that, after two years of inspections performed every six months, PSEG had neither identified significant corrosion buildup on the valve nor experienced a corrosion-related failure of the valve. The inspectors identified that since PSEG extended the PM interval, each of the three performances (2006, 2008, and 2010) of the 18-month PM completed before the May 2011 valve failure found excessive rust and severe corrosion on the H0KA-0KAV-004 outlet check valve's disc and internals (Order 20470895). In addition, on May 23, 2010, due to the excessive rust found during the April 2010 PM, technicians submitted a PM change request (PCR 80101517) that recommended moving the 18-month PM back to six months.

Hope Creek procedure WC-AA-111, "Predefined Process for PM Change Requests," states, in part, the "PMOC (Preventive Maintenance Oversight Committee) is responsible for driving sustainable improvements in equipment reliability and plant performance through improvements in the PM program." At the time of the May 2011 H0KA-0KAV-004 failure to open, PCR 80101517 had not been reviewed by the PMOC and no action had been taken to address the identified design issues - inappropriate valve internal materials given the wetted air to which the valve was exposed. The inspectors noted that PSEG missed these three opportunities to shorten the PM periodicity and prevent the H0KA-0KAV-004 check valve failure and subsequent 00-K-107 service air compressor trip. The inspectors concluded that PSEG's lack of action relative to maintaining service air system component reliability through PM program improvements led to the May 2011 H0KA-0KAV-004 failure.

After the May 12, 2011, failure, PSEG refurbished H0KA-0KAV-004's internals with new carbon steel components and plans to replace the 00-K-107 and 10-K-107 compressors' outlet check valves with stainless steel valves that are less susceptible to corrosion (Orders 60097323 and 60097371).

Analysis. The PMOC's failure to drive sustainable improvements in the 00-K-107 air compressor's reliability through improvements in the PM program as required by WC-AA-111 was a performance deficiency that was within PSEG's ability to foresee and correct. Specifically, after several recent performances of the 18-month PM found excessive corrosion and rust on the valve internals, PSEG did not either change the PM frequency of the degraded compressor outlet check valve (H0KA-0KAV-004) or change the material used in the valve's internals to one less susceptible to corrosion. Consequently, this check valve failed closed due to corrosion, tripped the air compressor, and caused a service and instrument air headers pressure transients followed by an automatic start of the EIAC.

This finding is more than minor because it was associated with the equipment performance attribute of the Initiating Events cornerstone and affected the cornerstone objective of limiting the likelihood of events that upset plant stability and challenge critical safety functions at power. Specifically, the failure to adequately maintain the compressor outlet check valve increased the likelihood of a plant trip. The inspectors evaluated this finding using IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," Table 4a, and determined the finding to be of very low safety significance (Green) because the finding does not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment would not be available. The finding has a cross-cutting aspect in the area of human performance, work control component; because PSEG did not appropriately coordinate work activities by incorporating actions to ensure that maintenance scheduling is more preventive than reactive. Specifically, PSEG did not shorten the PM interval or change the materials used in the valve internals before the valve failed shut and required reactive maintenance following a trip of the 00-K-107 air compressor. (H.3(b))

Enforcement. The service air compressor is not a safety-related component and no violation of regulatory requirements occurred. Because this finding does not involve a violation and has very low safety significance, it is identified as a finding. **(FIN 05000354/2011004-01, Inadequate Corrective Actions Associated with a Known Degraded Condition of the 00-K-107 Service Air Compressor Outlet Check Valve (H0KA-0KAV-004))**

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 - 4 samples)

a. Inspection Scope

The inspectors completed four maintenance risk assessment and emergent work control inspection samples. The inspectors reviewed on-line risk management evaluations through direct observation and document reviews for the following four plant configurations:

- C EDG and Salem Unit 3 out-of-service during week of July 11
- Emergent failure of C HPCI logic power and C EDG out-of-service on July 15
- Emergent failure of A EDG and Salem Unit 3 out-of-service on August 1
- Online risk was elevated from green to yellow on August 26, in response to a severe weather warning (Hurricane Irene) and PSEG reviewed scheduled work to confirm that no work would be performed that would increase the risk of a LOOP

The inspectors reviewed the applicable risk evaluations, work schedules, and control room logs for these configurations to verify that concurrent planned and emergent maintenance and test activities did not adversely affect the plant risk already incurred with these configurations. PSEG's risk management actions were reviewed during shift turnover meetings, control room tours, and plant walkdowns. The inspectors also used PSEG's on-line risk monitor (Equipment Out of Service workstation) to gain insights into the risk associated with these plant configurations. Finally, the inspectors reviewed notifications documenting problems associated with risk assessments and emergent work evaluations. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R15 Operability Evaluations (71111.15 - 3 samples)

a. Inspection Scope

The inspectors reviewed three issues to assess the technical adequacy of the operability determinations or operability screenings, the use and control of compensatory measures, and compliance with the licensing and design bases. As applicable, associated adverse condition monitoring plans, engineering technical evaluations, and operational and technical decision making documents were also reviewed. The inspectors verified these processes were performed in accordance with the applicable administrative procedures and were consistent with NRC guidance. Specifically, the inspectors referenced procedure OP-AA-108-115, "Operability Determinations," and NRC IMC Part 9900, "Operability Determinations & Functionality Assessments for Resolutions of Degraded or Nonconforming Conditions Adverse to Quality or Safety." The inspectors also used the TS, the technical requirements manual, and the UFSAR as references during these reviews. Additionally, the inspectors reviewed other PSEG identified safety-related equipment deficiencies during this report period and assessed the adequacy of their operability screenings. Documents reviewed are listed in the Attachment. The following degraded equipment issues were reviewed:

- HPCI non-conforming due to increase in room temperature
- A Chilled Water Pump degraded due to low flow trip
- HPCI degraded due to F028 & F029 valve steam leaks

b. Findings

Introduction. The inspectors identified a finding of very low safety significance (Green) involving a NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," in that, PSEG did not ensure the adequacy of HPCI design under post-accident conditions. Specifically, PSEG did not evaluate the impact of elevated temperature in the HPCI room on the operability of the HPCI system during a postulated design basis SBLOCA coincident with a LOOP and a single failure of the A emergency diesel generator (EDG).

Description. The design function of the HPCI system is to maintain reactor vessel inventory following the postulated SBLOCA. As stated in Hope Creek UFSAR section 6.3, HPCI was designed to remain operable during its most limiting accident, a SBLOCA and LOOP with the single failure of an EDG. Because both HPCI room coolers are powered by the A EDG, when the A EDG is assumed as the single failure, the system design requires HPCI to be operable without either room cooler.

During plant walkdowns between May 15, 2011, and July 26, 2011, the inspectors observed the HPCI room temperature was between 114°F and 116°F degrees as read at the HPCI isolation system instrument panel. During a HPCI steam line break, HPCI will isolate if instruments sense high room temperature (>160°F) or high differential temperature in the room ventilation (>70°F between HPCI room ventilation supply (reactor building air temperature) and exhaust temperatures (HPCI room temperature)). HPCI design document PN0-E41-4010-0072, "High Pressure Coolant Injection," states that HPCI room temperature during normal plant operations should be between 60°F to 100°F. Considering that HPCI room temperature was between 114°F and 116°F, the inspectors determined that PSEG did not have a design calculation that demonstrated that HPCI would not isolate due to either high room temperature or high room ventilation differential temperature during the most limiting accident.

PSEG initiated notifications 20518124 and 20520106 and performed an operability evaluation to verify HPCI operability during the most limiting accident. This evaluation concluded that HPCI operability could be challenged during extreme winter low temperatures because the very low HPCI room ventilation supply temperatures and post accident room heat up combined with the higher initial room temperature could cause the system to isolate on high differential temperature. To address this condition, PSEG plans to implement a design change to reduce the setpoints for the HPCI room coolers to lower the normal ambient HPCI room temperature. This will reduce the differential temperature between the ventilation supply and the room temperature and is expected to prevent HPCI from isolating during extreme winter low temperatures when HPCI room ventilation supply temperature is very low. The modification is currently scheduled to be implemented prior to the onset of winter weather conditions.

The inspectors identified prior opportunities for PSEG to identify this non-conforming condition. In August 2008, the inspectors questioned HPCI operability during SBO conditions (LOOP and loss of all EDGs) as documented in notification 20381041. Specifically, a HPCI room heat up calculation, GR-0022, Revision 3, Loss of Ventilation during SBO, assumed a maximum initial ambient HPCI room temperature of 104°F. In 2008, the inspectors observed actual room conditions greater than 104°F (notification 20381041). As corrective actions for this issue, PSEG conducted troubleshooting to identify the cause of the elevated temperature, but were unsuccessful. At that point, PSEG initiated action to revise GR-0022 and performed an operability evaluation that determined the acceptable starting HPCI room temperature during SBO conditions could be as high as 113°F. No additional action or evaluations were performed. Although PSEG appropriately evaluated the impact of the elevated normal operating HPCI room temperature on the SBO HPCI room heat up calculation, PSEG did not evaluate the impact of the elevated temperature on the HPCI systems response during other design basis accidents. The site's operability evaluation procedure required an extent of condition review be performed for conditions evaluated through that process.



The inspectors reviewed PSEG procedure, LS-AA-125, "Corrective Action Program," which defines extent of condition as the extent to which the identified condition has the potential to impact other plant processes, equipment, or human performance in the same manner as identified in the condition report. The inspectors found that in 2008, in response to the identified higher than normal HPCI room temperature, PSEG's extent of condition review determined that no other safety systems were constrained by initial room temperature heat up concerns. However, this extent of condition review narrowly focused on SBO conditions and, therefore, did not identify the impact of the initial ambient HPCI room temperature on other accident conditions, such as a SBLOCA and LOOP with the single failure of an EDG. Also, the inspectors noted that PSEG did not conduct a casual evaluation for notification 20381041 to determine why the actual HPCI room temperatures were above the initial HPCI room temperature assumed in the HPCI room design basis heat up calculation. The inspectors concluded that a casual evaluation could have identified that the room was not within the HPCI design document, PN0-E41-4010-0072, assumed normal room temperature of 60°F to 100°F.

Analysis. The inspectors concluded that the failure to adequately verify or check the design of the HPCI system under the most limiting accident conditions described in Hope Creek UFSAR section 6.3 after concerns regarding HPCI room temperature were identified by inspectors in 2008 was a performance deficiency. The performance deficiency was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. Specifically, PSEG had not evaluated HPCI operability using actual HPCI room temperatures during normal operating conditions, and as a result, HPCI's reliability during the most limiting accident conditions was not assured during extreme winter low temperatures. Also, this issue was similar to Example 3j of IMC 0612, Appendix E, "Examples of Minor Issues," because the condition resulted in reasonable doubt of the operability of the component, and additional analysis and compensatory actions were necessary to ensure HPCI operability during all environmental conditions.

The inspectors reviewed this condition using IMC 0609, Attachment 4, and in consultation with a Region I SRA, concluded that although this event constituted a deterministic safety functional failure, the HPCI system was likely capable of performing its significance determination process safety function, given the numerous postulated equipment failures and specific system configurations that would have to occur to cause the deterministic system failure. Therefore, each of the relevant questions in the Attachment 4 table would be answered no and this issue screened to very low safety significance (Green).

The finding had a cross-cutting aspect in the area of problem identification and resolution, corrective action component, because PSEG did not thoroughly evaluate a prior problem such that the problem resolution addressed the extent of condition. Specifically, PSEG's evaluation for notification 20381041, "HPCI Operability during SBO Conditions," did not identify the impact of actual HPCI room temperature during normal operating conditions on other accident conditions, such as a SBLOCA and LOOP with the single failure of an EDG. Therefore, PSEG did not identify that the HPCI room temperature was beyond the HPCI design document assumption of 60°F to 100°F. (P.1(c))

**Enforcement.** 10 CFR 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures be provided for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above, between August 20, 2008, and August 2, 2011, PSEG did not verify or check the adequacy of the HPCI system design under the most limiting accident conditions described in Hope Creek UFSAR section 6.3, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Specifically, PSEG did not perform adequate design reviews or testing to verify that the HPCI system would remain operable during a SBLOCA and LOOP with a single failure of an EDG after inspectors identified that the actual HPCI room normal operating condition temperature was greater than 104°F. PSEG determined through subsequent evaluation that HPCI was operable but non-conforming because there was a potential for HPCI system to isolate unnecessarily on high differential temperature during the extreme winter low temperatures. This issue was entered into CAP as notifications 20518124 and 20520106, and PSEG plans to implement a design change to reduce the setpoints of the HPCI room coolers so that the initial HPCI room temperature is maintained at a lower temperature before extreme winter conditions. Because this violation was of very low safety significance (Green) and has been entered into the CAP this violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. **(NCV 05000354/2011-004-02, HPCI Operability during SBLOCA/LOOP with the A EDG Failure)**

1R18 Plant Modifications (71111.18 - 1 sample)

a. Inspection Scope

The inspectors completed a review of one temporary modification package for the D CW pump hydraulic control unit plug due to a large hydraulic fluid leak on the pump discharge pressure indicator (TCCP 4HT-11-016). The inspectors verified that the design bases, licensing bases, and performance capability of the CW pump were not degraded by this temporary modification. The inspectors also verified the post-modification testing was adequate to ensure the SSCs would function properly. The 10 CFR 50.59 evaluation associated with this temporary modification was also reviewed. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 - 7 samples)

a. Inspection Scope

The inspectors completed seven post-maintenance testing inspection samples. The inspectors reviewed the post-maintenance tests for the maintenance items listed below to verify that procedures and test activities ensured system operability and functional capability following completion of maintenance. The inspectors reviewed applicable test procedures to verify that they tested all safety functions potentially affected by the associated maintenance activities. The inspectors verified that for each potentially affected safety function the acceptance criteria stated in the procedure was consistent

with the UFSAR and other design documentation. The inspectors witnessed completion of the testing or reviewed the completed test results to confirm acceptance criteria were met and verified satisfactory restoration of all safety functions affected by the maintenance activities. Documents reviewed are listed in the Attachment.

- A control area chilled water pump logic module replacement after pump trip on July 5
- C EDG rectifier replacement on July 14
- C channel of HPCI isolation logic replacement after power failure on July 15
- D RHR minimum flow check valve replacement on July 27
- A EDG intercooler pump replacement on August 3
- A fuel pool cooling pump corrective maintenance on August 7
- B EDG lube oil keep-warm pump replacement on September 13

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 - 3 Routine samples, 1 IST sample)

a. Inspection Scope

The inspectors completed four surveillance testing (ST) inspection samples. The inspectors witnessed performance of and/or reviewed test data for the risk-significant STs listed below to verify that the SSCs tested satisfied TSs, UFSAR, and procedure requirements. The inspectors verified that test acceptance criteria were clear, demonstrated operational readiness, and were consistent with design documentation; that test instrumentation had current calibrations and the correct range and accuracy for the application; and that tests were performed as written with applicable prerequisites satisfied. Upon ST completion, the inspectors confirmed that equipment was returned to the status specified to perform its safety function. Documents reviewed are listed in the Attachment.

- HPCI inservice test on July 7
- D EDG monthly surveillance test on July 25
- A standby liquid pump surveillance test on September 1
- B RHR pump inservice test run on September 13

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06 - 1 drill/ev sample)

a. Inspection Scope

The inspectors observed the classification and notification aspects of a licensed operator requalification training examination scenario in the Hope Creek simulator on August 15, 2011. The scenario was conducted, in part, to provide drill and exercise performance (DEP) opportunities for the DEP performance indicator (PI). The inspectors reviewed the conduct of the simulator exercise to identify any weaknesses and deficiencies in

classification and notification activities. The inspectors observed the evaluation, classification, and notification of the simulated events to ensure they were accurate, timely, and were done in accordance with Hope Creek Emergency Classification Guide. The inspectors verified that the drill evaluators correctly counted the drill's contribution in the calculation of the DEP PI. The inspectors verified that training evaluators captured the results for the DEP PI. The inspectors also verified that any weaknesses or deficiencies were captured and discussed during the critique of the training exercise, in order to properly identify and correct any weaknesses. Documents reviewed are listed in the Attachment. Emergency action level (EAL) # 8.2.2.a –Unplanned Loss of Most or All Control Room Annunciators and Significant Transient is in Progress or Compensatory Indicators are Unavailable – was classified during this training exercise:

b. Findings

No findings were identified.

**2. RADIATION SAFETY**

**Cornerstone: Radiation Safety - Public and Occupational**

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

a. Inspection Scope

The inspectors reviewed PSEG performance indicators (PI) for the Occupational Exposure Cornerstone for follow-up. The inspectors reviewed the results of radiation protection program audits. The inspectors reviewed reports of operational occurrences related to occupational radiation safety since the last inspection.

The inspectors verified that any transactions involving nationally tracked sources were reported in accordance with 10 CFR 20.2207.

*During tours of the facility and review of ongoing work, the inspectors evaluated ambient radiological conditions. The inspectors verified that existing conditions were consistent with posted surveys, radiation work permits (RWPs), and worker briefings, as applicable.*

During job performance observations, the inspectors verified the adequacy of radiological controls, such as required surveys, radiation protection job coverage, and contamination controls. The inspectors evaluated PSEG's means of using electronic personnel dosimeters in high noise areas as high radiation area (HRA) monitoring devices. The inspectors verified that radiation monitoring devices were placed on the individual's body consistent with the method that PSEG was employing to monitor dose from external radiation sources. The inspectors verified that the dosimeter was placed in the location of highest expected dose or that PSEG was properly employing an NRC-approved method of determining effective dose equivalent.

For high-radiation work areas with significant dose rate gradients, the inspectors reviewed the application of dosimetry to effectively monitor exposure to personnel. The inspectors verified that PSEG controls were adequate.

The inspectors reviewed RWP's for work within airborne radioactivity areas with the potential for individual worker internal exposures. The inspector evaluated airborne radioactive controls and monitoring, including potentials for significant airborne contamination. For these selected airborne radioactive material areas, the inspectors verified barrier integrity and temporary high-efficiency particulate air ventilation system operation.

The inspectors conducted selective inspections of posting and physical controls for HRAs and very HRAs, to the extent necessary, to verify conformance with the Occupational PI.

The inspectors observed radiation worker performance with respect to stated radiation protection work requirements. The inspectors determined that workers were aware of the significant radiological conditions in their workplace and the RWP controls/limits and that their performance reflected the level of radiological hazards present.

The inspectors reviewed radiological problem reports since the last inspection that found the cause of the event to be human performance errors. The inspectors determined that there was no observable pattern traceable to a similar cause. The inspectors determined that this perspective matched the corrective action approach taken by PSEG to resolve the reported problems. The inspectors discussed with the radiation protection manager any problems with the corrective actions planned or taken.

b. Findings

No findings were identified.

2RS2 Occupational As Low as Reasonably Achievable (ALARA) Planning & Controls  
(71124.02)

a. Inspection Scope

The inspectors verified that PSEG's planning identified appropriate dose mitigation features, commensurate with the risk of the work activity, alternate mitigation features, and defined reasonable dose goals. The inspectors verified that PSEG's ALARA assessment had taken into account decreased worker efficiency from use of respiratory protective devices and/or heat stress mitigation equipment. The inspectors determined that PSEG's work planning considered the use of remote technologies as a means to reduce dose and the use of dose reduction insights from industry operating experience and plant-specific lessons learned. The inspectors verified the integration of ALARA requirements into work procedures and RWP documents.

The inspectors compared the results achieved with the intended dose established in PSEG's ALARA planning for these work activities. The inspectors compared the person-hour estimates provided by maintenance planning and other groups to the radiation protection group with the actual work activity time requirements and evaluated the accuracy of these time estimates. The inspectors determined the reasons for any inconsistencies between intended and actual work activity doses. The inspectors focused on those work activities with planned or accrued exposure greater than five person-rem.

The inspectors determined that post-job reviews were conducted and that identified problems were entered into PSEG's CAP.

The inspectors verified that problems associated with ALARA planning and controls were being identified by PSEG at an appropriate threshold and were properly addressed for resolution in their CAP.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

a. Inspection Scope

The inspectors verified that PSEG provided respiratory protective devices such that occupational doses are ALARA. As available, the inspectors selected work activities where respiratory protection devices were used to limit the intake of radioactive materials, and verified that PSEG performed an evaluation concluding that further engineering controls were not practical and that the use of respirators was ALARA. The inspectors verified that PSEG had established means to verify that the level of protection provided by the respiratory protection devices during use was at least as good as that assumed in PSEG's work controls and dose assessment.

The inspectors verified that respiratory protection devices used to limit the intake of radioactive materials are certified by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration (NIOSH/MSHA) or had been approved by the NRC. The inspectors selected work activities where respiratory protection devices were used and verified that the devices were used consistent with their NIOSH/MSHA certification.

The inspectors reviewed records of air testing for supplied-air devices and self-contained breathing apparatus (SCBA) bottles. The inspectors verified that air used in these devices meet or exceeded Grade D quality. The inspectors verified that plant breathing air supply systems met the minimum pressure and airflow requirements for the devices in use.

The inspectors selected individuals qualified/assigned to use respiratory protection devices and verified that they had been deemed fit to use the device(s) by a physician. The inspectors observed them donning, removing, and functionally checking the device as appropriate. The inspectors verified that these individuals knew how to safely use the device and how to properly respond to any device malfunction or unusual occurrence. The inspectors also reviewed training curricula for users of the devices.

The inspectors chose respiratory protection devices staged and ready for use in the plant or stocked for issuance for use and observed the physical condition of the device components and reviewed records of routine inspection for each. The inspectors selected a sampling of the devices and reviewed records of maintenance on the vital components. The inspectors verified that onsite personnel assigned to repair vital components had received vendor-provided training.

Based on the Final Safety Assessment Report, TSs, and emergency operating procedure requirements, the inspectors reviewed the status and surveillance records of the SCBA staged in-plant for used during emergencies. The inspectors observed PSEG's capability for refilling and transporting SCBA air bottles to and from the control room and operations support center during emergency conditions.

The inspectors selected individuals on control room shift crews and individuals from designated departments currently assigned emergency duties and determined that control room operators and other emergency response and radiation protection personnel were trained and qualified in the use of SCBAs. The inspectors determined that personnel assigned to refill bottles were trained and qualified for that task.

The inspectors verified that appropriate mask sizes and types were available for use. The inspectors selected on-shift operators and verified that they had no facial hair that would interfere with the sealing of the mask to the face. The inspectors also verified that vision correction did not penetrate the face seal.

The inspectors reviewed the past two years of maintenance records for SCBA units used to support operator activities during accident conditions and designated as "ready for service." The inspectors verified that any maintenance or repairs on an SCBA unit's vital components were performed by an individual, or individuals, certified by the manufacturer of the device to perform the work. The inspectors reviewed the onsite maintenance procedures governing vital component work, and identified any inconsistencies with the SCBA manufacturer's recommended practices. For those SCBAs designated as "ready for service," the inspectors ensured that the required, periodic air cylinder hydrostatic testing was documented and up to date, and the retest air cylinder markings required by the U.S. Department of Transportation were in place.

b. Findings

No findings were identified.

**4. OTHER ACTIVITIES**

4OA1 Performance Indicator (PI) Verification (71151 - 1 sample)

Cornerstone: Mitigating Systems

.1 Review of Safety System Functional Failures (SSFFs) PI

a. Inspection Scope

The inspectors reviewed PSEG's submittals for the SSFF PI for Hope Creek (MS05). For the functional failures, the inspectors looked at the period from the July 1, 2010 through June 30, 2011. The PI definitions and the guidance contained in Nuclear Energy Institute 99-02, "Regulatory Assessment Indicator Guideline," Revision 6, and procedure LS-AA-2080, "Monthly Data Elements for NRC SSFFs," Revision 5, were used to verify that procedure and reporting requirements were met.

The inspectors reviewed licensee event reports (LERs) issued during the referenced timeframe for SSFFs. Documents reviewed are listed in the Attachment. The inspectors

also compared graphical representations from the most recent PI report to the raw data to verify that the data was correctly reflected in the report.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 - 2 Reviews samples)

.1 Routine Review of Items Entered into the CAP

a. Inspection Scope

As required by IP 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of all items entered into PSEG's CAP. This was accomplished by reviewing the description of each new notification and attending management review committee meetings.

b. Findings

No findings were identified.

.2 Annual Sample: Corrective Actions for EDG Room Cooler Recirculation Fan Trips

a. Inspection Scope

Each of the four EDG rooms is provided with two safety-related room cooler recirculation fans and two cooling coil assemblies. Under normal operating conditions, these recirculation fans and cooling coil assemblies are fully redundant, each capable of providing 100 percent of the cooling requirement for its respective EDG room. During periods of operation when the ultimate heat sink (UHS) temperature is above 80°F, and based on the SACS alignment, both recirculation fans are required or procedurally-driven SACS valve realignments are needed to allow single fan operation. The auto-lead fan is designed to start on elevated room temperature or an EDG start. When positioned to "auto," the backup fan is designed to start on elevated room temperature concurrent with an EDG start or a low flow condition on the auto-lead fan (given a start demand). Since January 2010, PSEG identified 12 unexpected recirculation fan trips (2 on A V412 fan, 8 on B V412 fan, and 2 on C V412 fan), with recent trips occurring on July 28, 2011 (notification 20519905 on A) and August 1, 2011 (notification 20520452 on B). This inspection focused on PSEG's problem identification, evaluation, and resolution associated with the EDG recirculation fan trips and potential reliability challenges.

The inspectors reviewed PSEG's associated apparent cause evaluation (ACEs), troubleshooting plans, extent-of-condition reviews, and short and long term corrective actions. The inspectors observed several of the EDG recirculation fans while in service, after they had started on elevated room temperature or following an EDG start (i.e., the planned D EDG start on August 22), to assess their operating performance with respect to design basis requirements and system specifications. The inspectors performed walkdowns of the EDG rooms, accessible portions of the EDG recirculation fan trains, recirculation fan 480V motor control center breakers, and the recirculation fan alarm and



control panels (including an internal visual inspection of the four recirculation fan relay cabinets). The inspectors performed these walkdowns to independently assess the material condition, operating environment, potential operator challenges, maintenance practices, and configuration control. The inspectors also reviewed temperature switch and flow control switch calibration results, fan train corrective and preventive maintenance records, operating logs, fan control logic diagrams, engineering evaluations, laboratory analysis reports, related industry operating experience (OE), and EDG room temperature trend data to assess the adequacy of PSEG's corrective actions and to ensure TS compliance. The inspectors also discussed recirculation fan performance and operational alignments with the system engineer, senior reactor operators, and equipment operators to review the design and system functional requirements, as well as obtain historical performance and trend data.

The inspectors reviewed a sample of EDG recirculation fan problems that PSEG identified and entered into the CAP since October 2007. The inspectors reviewed these issues to verify an appropriate threshold for identifying issues and to evaluate the effectiveness of corrective actions. In addition, the inspectors reviewed corrective action notifications written on issues identified during the inspection to verify adequate problem identification and incorporation of the problem into the CAP. Documents reviewed are listed in the Attachment.

b. Findings and Observations

No findings were identified. The inspectors concluded that, in general, PSEG had taken timely and appropriate action in accordance with the Hope Creek TSs, operating and alarm response procedures, and PSEG's CAP. The inspectors determined that PSEG's associated ACEs were sufficiently thorough and based on the best available information, controlled troubleshooting, testing (including independent laboratory analysis), sound engineering judgment, and relevant industry OE. PSEG's assigned corrective actions were aligned with the identified casual factors, adequately tracked, appropriately documented, and completed as scheduled.

However, during an internal visual inspection of the associated safety-related EDG recirculation fan alarm and relay cabinets (A-E C483), the inspectors noted several minor configuration control and housekeeping issues. Specifically, the inspectors noted no functional lighting in any of the cabinets, an old deficiency tag (dated 9/3/1995) hanging in one cabinet stating that bulbs were replaced and lights still do not work, some debris, and missing and/or displaced air filter/debris screens in two cabinets. PSEG promptly initiated corrective action notifications (20523012, 20523532, 20523533, 20523534, and 20523535) for these issues. In accordance with the guidance in Inspection Manual Chapter (IMC) 0612, Appendix B "Issue Screening" and Appendix E, "Examples of Minor Issues," the inspectors determined none of the performance deficiencies identified during the cabinet inspections were more than minor because, based upon the material conditions observed by the inspectors, the operability of the associated equipment was not affected by the minor configuration control and housekeeping issues.

### .3 Annual Sample: Technical Rigor of Vendor Engineering Evaluations

#### a. Inspection Scope

This inspection focused on PSEGs' problem identification, evaluation, and resolution associated with technical rigor of vendor produced engineering evaluations. The inspectors reviewed a PSEG Nuclear Oversight (NOS) performance review from October 2010 to January 2011 that identified a declining trend in engineering technical rigor and notification 20494454, NOS Evaluation Hope Creek Engineering Technical Rigor, documented this deficiency. The inspectors reviewed NOS Elevation Notice NOH11-002, dated January 26, 2011, that specifically addressed this issue as a condition adverse to quality. The inspectors reviewed the ACE and a sample of corrective actions to evaluate the effectiveness of corrective actions and to ensure that they addressed the cause of this declining trend in vendor produced engineering evaluations. The following corrective actions were reviewed: conduct a needs analysis for knowledge gaps in the implementation of error prevention tools with regard to engineering technical products, improve Fundamentals Management System (FMS) tasks list to include other engineering products associated with technical rigor, establish an engineering technical rigor prevention of events triangle and establish the thresholds and criteria, and implement the owner's acceptance review of external technical product review checklist.

The inspectors reviewed several Design Change Packages (DCPs) to assess engineering rigor. Specifically, the inspectors reviewed DCP 80103378, Install 1E Service Water Cable Vault Dewatering System for Manholes 102, 103, and 105, and DCP 80102874, Hope Creek Reactor Feed Pump Turbine Lube Oil Single Point Vulnerability Mitigation. The inspectors reviewed a sample of corrective action notifications written on engineering rigor type deficiencies from January 2011 to September 2011. The inspectors performed a review of PSEG's FMS tool that provides feedback to PSEG engineering personnel and vendors concerning reviews of engineering documents, including engineering evaluations. The inspectors reviewed PSEG engineering internal departmental report for 2<sup>nd</sup> cycle of 2011. Documents reviewed are listed in the Attachment.

#### b. Findings and Observations

No findings were identified. Specific examples lacking technical rigor identified by NRC inspectors were: RHR leaking heat exchanger (HX) evaluation; safety system gas accumulation evaluation; and primary containment isolation valve evaluation. All of these issues resulted in NRC identified findings.

The PSEG cause and effect analysis identified the following casual factors (CFs) for this problem: CF #1, ineffective use of error mitigation tools and techniques, and CF #2, improper technical process usage. The apparent causes were insufficient oversight and accountability and less than adequate understanding of the criteria used to determine the correct technical process. PSEG implemented 18 corrective actions to address this issue, some of which included training on an industry guidance document titled "Principles for Maintaining an Effective Technical Conscience and Focus FMS Observations on Technical Rigor." The inspectors noted that the ACE was sufficiently thorough and the corrective actions were aligned with the CFs, appropriately documented, adequately tracked, and being completed as scheduled.

The inspectors found that approximately 304 documented FMS observations of engineering technical rigor were performed by PSEG engineering supervisors between January 26, 2011, and September 27, 2011, compared to only 12 FMS observations of engineering technical rigor between September 1, 2010, and January 26, 2011. The inspectors concluded that constructive comments provided appropriate feedback to the engineer that produced the engineering document. No deficiencies were identified in the DCPs reviewed and the inspectors noted that in PSEG engineering internal departmental report for 2<sup>nd</sup> cycle of 2011, technical rigor in engineering showed an improving trend.

The inspectors concluded, therefore, that, in general, PSEG had taken timely and appropriate action in accordance with their CAP to address engineering technical rigor for vendor produced evaluations. The inspectors acknowledged that significant steps were taken by PSEG to address the issue. However, the NRC inspectors also identified two examples of inadequate engineering technical rigor related to NRC submittals.

- Incorrect information appears to have been submitted to the NRC in the license amendment for the EDG allowed outage time extension. Specifically, the submittal referenced and specified High Pressure Coolant Injection/Reactor Core Isolation Cooling final Station Blackout Operating temperatures in a non-active calculation. The active calculation would result in increased temperatures. Notification 20518067 was written to document this deficiency.
- Discrepancies were found in the Final Feedwater Temperature Reduction safety analysis report vs. PSEG amendment request. Notification 20523860 was written to address this deficiency.

Based on these two examples, the inspectors concluded that the scope of the reviews PSEG conducted in response to notification 20494454, did not encompass NRC-related documents like TS amendments or requests for additional information. However, for the two examples discussed above, the inspectors did not identify findings because, in each case, the associated licensing activity had not become a part of the current licensing and design basis and, as stated above, PSEG had entered the issues into the corrective action program for evaluation and correction. In addition, as of the date of this report, both issues were resolved.

#### 4OA3 Event Follow-up (71153 – 5 samples)

##### .1 (Closed) LER 05000354/2010-001-01, Technical Specification Surveillance Requirement Not Met

In LER 05000354/2010-001-00, PSEG reported that two SACS HX bypass valves (EG-HV-2457A/B) were not adequately tested in accordance with the requirements of TS surveillance requirement 4.7.1.1.b. The inspectors' review of this LER was documented in NRC Inspection Report (IR) 05000354/2010004. In Supplement 01 of this LER (05000354/2010-001-01), PSEG identified that extent of condition reviews identified an additional pair of SACS HX bypass valves (EG-HV-2517A/B) had also not been adequately tested in accordance with TS surveillance requirement 4.7.1.1.b. These issues were entered into the CAP under notification 20470714. Corrective actions completed under Order 70111202 included testing the valves under TS surveillance requirement 4.7.1.1.b before returning them to operation and reviewing other automatic SACS and station SW valves for extent of condition. No other missed surveillances were identified. The enforcement aspects associated with the closure of this LER and

Supplement 01 were discussed and documented in Section 4OA7 of IR 05000354/2010004. No new issues of concern were identified by the NRC during its review of the new information provided by PSEG in this supplement. This LER is closed.

.2 (Closed) LER 05000354/2010-002-00 and LER 05000354/2010-002-01, As-Found Values for Safety Relief Valve Lift Setpoints Exceed Technical Specification Allowable

Between November 2 and November 29, 2010, PSEG received test results indicating that the as-found lift setpoints for 6 of 14 main steam SRVs failed to open within the required TS actuation pressure setpoint tolerance. TS 3.4.2.1 provides an allowable pressure band of +/-3 percent for each SRV. All six of the SRVs opened above the required pressure band. PSEG determined that the apparent cause for the A, C, K, L, and P SRV setpoint failures was corrosion bonding/sticking of the pilot disc. The apparent cause for the G SRV setpoint failure was related to misaligned internal parts caused by uneven loading in the pilot spring. These issues were placed into the CAP under notifications 20483383 and 20525076. The pilot assembly for each of the 14 SRVs was replaced with a fully tested spare assembly. Additionally, this LER stated a PSEG proposal to replace the SRVs is being considered through the plant modification process. Although this LER reports the inoperability of six SRVs, this event did not result in a loss of system safety function based on engineering analyses. These analyses showed that the SRVs would have functioned to prevent a reactor vessel over-pressurization and that postulated piping stresses would not exceed allowable limits. The enforcement aspects of this finding are discussed in Section 4OA7. These LERs are closed.

.3 (Closed) LER 05000354/2011-001-00, HPCI Operation Credit in UFSAR Scenario not Supported by Existing Documentation

Hope Creek Engineering identified a condition when the HPCI system would potentially not fulfill its safety function. The HPCI room ventilation differential temperature trip setpoint of 70°F, which is intended to isolate HPCI in the event of a steam leak, has the potential to isolate HPCI prematurely during extreme winter temperatures. This premature system isolation could impact the ability of HPCI to fulfill its design function during one of the accident scenarios listed in UFSAR Table 6.3-6, specifically the assumed single failures listed is the loss of an EDG coincident with a LOCA and a LOOP.

A PSEG engineering assessment determined that HPCI was not challenged by maximum room differential temperatures during warm ambient operating temperatures. However, the ability of HPCI to perform its design function during assumed single failure of an EDG coincident with a LOCA and a LOOP during extreme winter temperatures (i.e., which would result in the maximum room inlet to outlet differential temperature) was not fully evaluated. As a result of a July 28, 2011 assessment, PSEG entered this issue into the CAP (notifications 20518124 and 20520106). The inspectors concluded that this event was classified as a safety system functional failure. The inspectors' review of this LER and the related enforcement action is documented in section 1R15.

.4 Event Notice #47192: Notification of an Unusual Event Due to Seismic Event

a. Inspection Scope

On August 23, 2011, PSEG personnel informed the resident inspectors located in the main control room that an event notification report was planned to meet the requirements of 10 CFR 50.72(a)(1)(i), "Emergency Declared." Specifically, at 1400 hours, Hope Creek and Salem generation stations declared a common site Unusual Event in accordance with EAL 9.5.1.a due to an earthquake felt by onsite personnel within the protected area. Hope Creek continued operating at full RTP. All emergency cooling systems were available and in standby alignment. PSEG conducted multiple walkdowns of safety-related areas with no significant anomalies noted. At 1930 hours, Hope Creek and Salem terminated their Notification of Unusual Event.

The inspectors responded to the seismic disturbance felt onsite on August 23, 2011. The inspectors observed control room operators response to alarms received as a result of the event and use of the applicable abnormal operating procedures. The inspectors performed independent walkdowns of control room instrument panels and risk significant SSCs for indications of adverse impact or off-normal conditions. The areas walked down included the EDGs, fuel storage tanks and transfer pumps, switchgear rooms, safety-related ventilation fans, SW pumps, intake structure, seismic monitoring panel, reactor building (including 132' blowout panel), emergency core cooling systems, hydraulic control units, standby liquid control, and safety auxiliary cooling pumps and HXs. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.5 Hurricane Irene: Preparations and Response

a. Inspection Scope

From August 23 to August 27, 2011, the inspectors reviewed PSEG's activities to prepare for the potential arrival of Hurricane Irene. PSEG personnel implemented the actions specified by procedure OP-AA-108-111-1001, "Severe Weather and Natural Disaster Guidelines." The inspectors observed activities that included: securing or removing outside equipment to preclude windborne missiles; closure of watertight doors; just-in-time training for plant shutdown and start-up; sandbagging of selected non-safety related access points; and increased staffing of emergency response organization personnel with preparations for sequestering.

On August 27, 2011, inspectors responded to the Hope Creek site due to the expected arrival of Hurricane Irene within the next 24 hours. The inspectors noted that PSEG had staffed but not activated the Operations Support Center (OSC). PSEG considered the enforcement discretion guidance in NRC Enforcement Guidance Memorandum (EGM) 09-008, "EGM - Positioning Violations of NRC Requirements for Work Hour Controls Before and Immediately After a Hurricane Emergency Declaration," dated September 24, 2009, and sequestered essential site personnel. The inspectors monitored plant activities in the main control room and the OSC and monitored selected plant parameters, including: actual and projected onsite weather conditions; offsite power status; key safety equipment status; intake conditions; plant equipment issues; security posture and equipment issues; and emergency planning considerations. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4OA5 Other Activities

Operation of an Independent Spent Fuel Storage Installation (ISFSI) at Operating Plants (60855.1)

The inspectors verified by direct observation and independent evaluation that PSEG had performed loading activities at the ISFSI in a safe manner and in compliance with applicable procedures. The inspectors toured the ISFSI and reviewed radiological surveys performed during the past 12 months.

4OA6 Meetings, including Exit

On October 13, 2011, the inspectors presented inspection results to Mr. J. Perry, Station Vice President, and other members of his staff. The inspectors asked PSEG whether any materials examined during the inspection were proprietary. No proprietary information was identified.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy, for being dispositioned as a NCV:

- In Modes 1, 2, and 3, Hope Creek TS 3.4.2.1, "Safety Relief Valves," requires that 13 of the 14 SRVs open within +/-3 percent of the specified code safety valve function lift settings or else be in Mode 3 within 12 hours and in Mode 4 within the next 24 hours. Contrary to this requirement, PSEG identified between November 2 and November 29, 2010, that six of the 14 SRVs were determined to have their as-found setpoints in excess of the TS allowable tolerance, thus leaving eight operable SRVs. PSEG replaced the pilot assembly for each of the 14 SRVs with a fully tested spare assembly. In addition as discussed in Section 4OA3, PSEG determined that the apparent cause for 5 of the 6 SRV setpoint failures was corrosion bonding/sticking of the pilot disc. Therefore PSEG is also currently evaluating replacing the SRVs with a design not susceptible to corrosion bonding through the plant modification process. PSEG entered this issue into their CAP as notifications 20483383 and 20525076. This TS violation was associated with the Mitigating Systems cornerstone but PSEG determined, through engineering analyses that, given a design bases event, postulated piping stresses would not have exceeded allowable limits with 6 of 14 SRVs inoperable and the SRVs would have functioned to prevent a reactor vessel over-pressurization. Therefore, this finding was of very low safety significance (Green) based on a Phase 1 SDP screening, because it did not represent an actual loss of system safety function, and was not potentially risk significant for external events. The LERs associated with the event are documented in Section 4OA3.2.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee Personnel

J. Perry, Hope Creek Site Vice President  
 D. Lewis, Hope Creek Plant Manager  
 E. Carr, Operations Director  
 M. Gaffney, Regulatory Assurance Manager  
 M. Reed, Shift Operations Superintendent  
 K. Knaide, Work Management Director  
 P. Duca, Senior Engineer, Regulatory Assurance  
 C. Johnson, Senior Engineer  
 W. Kopchick, Engineering Director  
 E. Cassuilli, Plant Engineering Manager  
 F. Mooney, Maintenance Director  
 A. Shabazian, Maintenance Rule Coordinator  
 J. Shelton, Environmental Affairs - Nuclear  
 H. Trimble, Radiation Protection Manager  
 R. Kocher, System Engineer  
 W. Schmidt, Instrumentation and Controls Supervisor

### LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

#### Opened/Closed

05000354/2011004-01	FIN	Inadequate Corrective Actions Associated With a Known Degraded Condition of the 00-K-107 Service Air Compressor Outlet Check Valve (H0KA-0KAV-004) (Section 1R12)
05000354/2011004-02	NCV	HPCI Operability during SBLOCA/LOOP with the A EDG Failure (Section 1R15)

#### Closed

05000354/2010-001-01	LER	Technical Specification Surveillance Requirement Not Met (Section 4OA3.1)
05000354/2010-002-00 and 05000354/2010-002-01	LER	As-Found Values for Safety Relief Valve Lift Setpoints Exceed Technical Specification Allowable (Section 4OA3.2)
05000354/2011-001-00	LER	HPCI Operation Credit in UFSAR Scenario not Supported by Existing Documentation (Section 4OA3.3)

## LIST OF DOCUMENTS REVIEWED

In addition to the documents identified in the body of this report, the inspectors reviewed the following documents and records:

Hope Creek Generating Station UFSAR  
 Technical Specification Action Statement Log  
 HCGS NCO Narrative Logs

### **Section 1R01: Adverse Weather Protection**

#### Procedures

HC.OP-AB.BOP-0004, Grid Disturbances, Revision 18  
 OP-AA-108-111-1001, Severe Weather and Natural Disaster Guidelines, Revision 6  
 HC.OP-AB.MISC-0001, Acts of Nature, Revision 18  
 OP-AA-101-112-1002, On-Line Risk Assessment, Revision 5  
 HC.MD-PM.ZZ-0007, Missile Resistant and Watertight Doors PM  
 HC.MD-GP.ZZ-0037, Plant Bulkhead Doors Overhaul  
 HC.OP-ST.ZZ-0003, Reactor Building/Secondary Containment Integrity Verification Monthly

#### Preventive Maintenance Plans

PM019715, PM/12M Clean, Inspect Plant Doors  
 PM019747, PM/12M Clean, Inspect Plant Doors  
 PM019810, PM/12M Clean, Inspect Plant Doors  
 PM018797, 6M Lube Radiation Shielding Door S13

#### Drawings

A-0702-0, Door & Hardware Schedule, Pressure-Tight Doors, Revision 17  
 A-0703-0, Door & Hardware Schedule, Pressure-Tight Doors, Revision 10  
 A-0203-0, General Plant Floor Plan, Level 3 - Elevation 102'-0"  
 A-0202-0, General Plant Floor Plan, Level 2 - Elevation 77'-0"

#### Notifications

20524508, Entry into AB.MISC-0001 for Tide Level 95 Feet  
 20524597, Entry into AB.MISC-0001 for Tide Level 95 Feet  
 20524759, HC.OP-AB.MISC-0001 Entry High River Level  
 20524933, AB.MISC-0001 Condition A & B >95 Feet  
 20527105, Entered AB.MISC-0001 Condition A & B  
 20527239, Entered AB.MISC-0001  
 20527432, Entered HC.OP-AB.MISC-0001  
 20527457, Entered HC.OP-AB.MISC-0001 Condition A & B  
 20527564, AB.MISC-0001 Entry Due to High River Level  
 20527618, Entered HC.OP-AB.MISC-0001 Condition A & B  
 20527761, Entered AB.MISC-0001 Condition A & B  
 20526019, PM Required for TS Door 3315B  
 20529694, Unit 2 Watertight Door Inspections



**Section 1R04: Equipment Alignment****Procedures**

ER-HC-310-1009, HCGS System Functional Level Maintenance Rule Scoping Document, Revision 7

HC.OP-AB.BOP-0006, Main Condenser Vacuum, Revision 14

HC.OP-SO.DA-0001, Circulating Water System Operation, Revision 52

HC.OP-SO.BC-0001, Residual Heat Removal System Operation, Revision 49

HC.OP-SO.KJ-0001, Emergency Diesel Generator Operation, Revision 59

**Notifications**

20514273      20517023      20517089      20517214      20520292

**Orders**

60097699      80101927

**Drawings**

M-09-1, P&ID Circulating Water, Revision 41

M-51-1, P&ID Residual Heat Removal, Revision 41

M-30-1, Sheet 1, Diesel Engine Auxiliary Systems Fuel Oil, Revision 26

M-30-1, Sheet 2, Diesel Engine Auxiliary Systems Intercooler and Injection Cooling, Jacket Water, Crank Case Vacuum Air Intake, Exhaust and Vibration Monitoring Systems, Revision 20

M-30-1, Sheet 3, Diesel Engine Auxiliary Systems Starting Air and Lubricating Oil, Revision 19

**Section 1R05: Fire Protection Measures****Procedures**

FRH-II-532, Lower Control Equipment Room, Revision 6

FRH-II-412, RCIC Pump & Turbine Room, Revision 3

FRH-II-413, HPCI Pump & Turbine Room, Revision 3

FRH-II-433, A SACS Heat Exchanger & Pump Room, Revision 4

FRH-II-432, B SACS Heat Exchanger & Pump Room, Revision 3

FRH-II-541, Class 1E Switchgear Rooms, Elevation 130'-0"

FP-AA.014, Fire Protection Training Program, Revision 0

**Other Documents**

FP-AA.014, Fire Drill Form 4, Hope Creek Diesel Building 130' Elevation, Room 5411 (SAP# 52904340)

Notification 20527569, Incomplete Coverage for Portable Radios

**Section 1R06: Flood Protection Measures****Procedures**

OP-HC-103-102-1005, High Energy and Internal Flooding Barrier Control Program, Revision 1

FRH-II-541, Class 1E Switchgear Rooms, Elevation 130'-0"

**Notifications**

20508557      20508558

Orders

60096728      70123806

Drawings

M-33-0, Sheet 1, Low Volume &amp; Oily Waste Water Treatment

M-97-0, Sheet 2, Bldg &amp; Equipment Drains, - Aux. Bldg Control &amp; Diesel Areas Oily, Normal &amp; Chemical Waste Systems

A-5654-0, Aux. Bldg Control/Diesel Floor Plan at EI 124'/130'

Calculations

19-11, Moderate Energy Line Break Analysis for Elevations 137'/146'/150', 155'3"/163'6," and 178', Revision 0

19-18, Maximum Flood Levels in Control &amp; Diesel Generator Areas, Revision 6

EG-0046, STACS Operation, Revision 7

**Section 1R11: Licensed Operator Requalification Program**Procedures

OP-AA-1, Conduct of Operations, Revision 1

OP-AA-103-102, Watchstanding Practices, Revision 8

OP-AA-101-111-1002, Operations Fundamentals, Revision 4

OP-AA-101-111-1004, Operations Standards, Revision 3

OP-AA-101-111-101, Operations Philosophy Handbook, Revision 5

Other Documents

Simulator Scenario Guide-683, Trip of PCP, RR Runaway/Trip, Fuel Clad Failure, Loss of BD483, Stuck Open SRV, dated 8/9/2011

**Section 1R12: Maintenance Effectiveness**Procedures

EPRI TR-106857, Preventive Maintenance Basis

ER-AA-400-1001, Check Valve Monitoring and Preventive/Predictive Maintenance Program, Revision 8

ER-HC-310-1009, HCGS System Functional Level Maintenance Rule Scoping Document, Revision 7

HC.MD-PM.KA-0002(Z), Service Air Compressor Preventive Maintenance, Revision 9

HC.OP-AB.COMP-0001, Instrument and/or Service Air, Revision 4

LS-AA-120, Issue Identification and Screening Process, Revision 10

MA-AA-716-210, Performance Centered Maintenance Process, Revision 7

MA-AA-716-210-1001, PCM Templates, Revision 11

MA-AA-716-230, Predictive Maintenance Program, Revision 6

WC-AA-111, Predefine Process, Revision 6

Notifications (\*NRC identified)

20458465	20470895	20510356	20510973	20516747	20516747
20517712*					

Orders

30126129	30144535	30167388	30192666	60097323	70080085
----------	----------	----------	----------	----------	----------

70112378      70124136      70124136

Other Documents

Maintenance Plan 25042

PCR 80101517

**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

Procedures

HC.OP-AB.MISC-0001, Acts of Nature, Revision 18

OP-AA-101-112-1002, On-Line Risk Assessment, Revision 5

WC-AA-101, On-Line Work Management Process, Revision 19

Other Documents

HCGS PRA Risk Evaluation for Work Week 1128, Revision 0

Operator Narrative Logs for 8/26/2011, 8/27/2011, and 8/28/2011

**Section 1R15: Operability Evaluations**

Calculations

10855-D3.38, Design, Installation and Test Specification for High Pressure Coolant Injection System for the Hope Creek Generating Station, Revision 9

10855-N0-E41-4010-97 (1)-1, High Pressure Coolant Injection System Design Specification, Revision 0

10855-N0-E41-40101387 (1)-1, HPCI System Design Specification Data Sheet, Revision 5

PN0-E41-4010-0072 (1)-10, High Pressure Coolant Injection, Revision 10

DE-PS.ZZ-0010, HCGS Separation Review Data Sheet, Revision 1

E-5.1, HC Class 1E 250VDC Station Battery & Charger Sizing, Revision 8

GR-0022, Loss of Ventilation during Station Blackout (SBO), Revision 3

GR-0022, Loss of Ventilation during Station Blackout (SBO), Revision 2

SC-SK-0006, HPCI&RCIC Pump Room & Steam Pipe Routing Area Ambient Temperature, Revision 6

SC-SK-0040, RCIC & HPCI Pump Rooms 4110/4111 Delta T, Revision 5

11-85, Leak Detection Temperature Setpoints, Revision 1

11-0066, HCGS FRVS Drawdown and Long-Term Post-LOCA Reactor Building Temperatures – EPU, Revision 8

Procedures

ER-AA-390-1001, Control Room Envelope Habitability Program Implementation, Revision 1

LS-AA-125, Corrective Action Program, Revision 14

HC.IC-CC.SK-0003, HPCI – Division 1 Steam Leak Detection Temperature Monitor 1SKXR-11501, Revision 18

HC.OP-AB.ZZ-0135, Station Blackout/Loss of Offsite Power/Diesel Generator Malfunction, Revision 33

HC.OP-FT.GJ-0001, AK400 Control Area Chilled Water System Venting – Monthly, Revision 1

HC.OP-FT.GJ-0003, AK403 IE Panel Room Chilled Water System Venting – Monthly

HC.OP-IS.GJ -0001, 'A' Control Area Chilled Water Pump In-service Test, Revision 29

HC.OP-IS.GJ-0003, 'A' Safety Related Panel Room Chilled Water Pump In-service Test, Revision 41

HC.OP-SO.GJ-0001, A(B)K400 Control Area Chilled Water System Operation, Revision 52

HC.OP-SO.GJ-0001, A(B)K400 Control Area Chilled Water System Operation, Revision 52  
 HC.OP-ST.GK-0001, 'A' Control Room Emergency Filtration System Functional Test,  
 Revision 13  
 HC.OP-ST.GK-0002, Control Room Emergency Filtration System Isolation Actuation Functional  
 Test, Revision 13  
 HC.OP-ST.GU-0001, FRVS Operability Test (All Fans Method), Revision 37  
 HC.OP-ST.GU-0003, FRVS Operability Test (Four Recirculation Fans One Vent Fan Method),  
 Revision 4

Notifications (\*NRC identified)

20376444	20376886	20396161	20396188	20481909	20486108
20501058	20516990	20522708			

20521711, GEH Part 21 Failure to Include Seismic  
 20526053, HPCI Steam Supply Valve Leaking By  
 20526006, HPCI Room Cooler Drains Clogged  
 20525331, Reevaluate HPCI Steam Leak  
 20524928, HPCI STM Drain LV-F054 Leaks By  
 20521777\*, HPCI HV-F028 Leak by  
 20514298\*, NRC identified issue with temp alarms  
 20520106\*, HPCI Room Temperature Operability Challenge  
 20518841\*, HPCI Operability Determination  
 20519206\*, ECCS Room Coolers  
 20518291\*, Eval Cal Range of HPCI RM Temp (NRC)  
 20518124\*, UFSAR Table 6.3-6 Statement is Unsubstantiated  
 20514104\*, HPCI Mission Time/Operability  
 20523099\*, NRC Resident Identified Questions  
 20523094\*, NRC Resident Identified Questions  
 20381041\*, Higher Initial Temperatures in HPCI and RCIC than SBO  
 20525385\*, HPCI Delta T Isolation Tech Spec Change  
 20525583\*, HPCI Long Term DT Tech Spec Change  
 20527423\*, HPCI Room Temp Issue Evaluation Level  
 20529330\*, HPCI Room Cooler Setpoint Change  
 20529205\*, HPCI Standby Room Cooler Setpoint Change  
 20527282\*, Ensure SSFF Entry into INPO CDE

Orders

20408313	30178413	70046024	70087284	70093083	70093203
70111708	80104505				

70126660, HPCI Operability Evaluation  
 80104863, HPCI Room Cooler Setpoint Change  
 60098044, Adverse Condition Monitoring and Contingency Plan – Monitoring of Steam Leak on  
 H1FD-FD-HV-F029  
 70126793, Interim Use-As-Is Disposition for HPCI Room Temperature and Ventilation Air  
 Temperature Difference across the Room

Drawings

M-90-1, Aux Bldg Control Area Chilled Water System Control Area Chillers, Revision 0

Other Documents

VTD PJ200-1123, 862 System Aux Bldg Control Area Chilled Water Pump AP400, Revision 8

VTD PJ200-1140, 862 System Aux Bldg Control Area Chilled Water Pump AP400, Revision 11  
 VTD PM723-121, Instruction Manual Centrifugal Refrigeration Machine, Revision 29  
 Hope Creek Control Room Narrative Logs for night shift on August 16, 2011  
 11-005, HPCI Operability Evaluation, Revision 0  
 11-005, HPCI Operability Evaluation, Revision 1  
 11-005, HPCI Operability Evaluation, Revision 2  
 LR-N11-0294, Licensee Event Report 2011-001 HPCI Operation Credit in UFSAR Scenario not  
 Supported by Existing Documentation, Revision 0  
 60098044, Adverse Condition Monitoring and Contingency Plan – Monitoring of Steam Leak on  
 H1FD-FD-HV-F029

### **Section 1R18: Plant Modifications**

#### Procedures

HC.OP-SO.DA-0001, Circulating Water System Operation, Revision 52

#### Notifications

20518634

#### Orders

60097945      80104589      80104652

#### Drawings

M-09-1, P&ID Circulating Water, Revision 41

P-0076-0/001, Equipment Location Circulating Water Structure, Revision 17

#### Calculations

D3.8 – Design, Installation and Testing Specifications for Circulating Water Pumps, Revision 0

#### 50.59 Reviews, Screenings and Evaluations

HC-11-016, TCCP 11-016/80104652, Revision 0

### **Section 1R19: Post-Maintenance Testing**

#### Procedures

HC.MD-FT.KJ-0004, Emergency Diesel Generator Voltage Regulator Testing/Calibration,  
 Revision 3

HC.OP-AB.ZZ-0147, DC System Grounds, Revision 4

HC.OP-AB.ZZ-0150, 125 VDC System Malfunction, Revision 6

HC.OP-IS.BJ-0101, High Pressure Coolant Injection System Valves – Inservice Test, Revision  
 62

HC.OP-ST.KJ-0005, Integrated Emergency Diesel Generator 1AG400 Test (18M), Revision 36

HC.OP-ST.KJ-0001, Emergency Diesel Generator Operability Test, Revision 74

HC.OP-IS.BC-0004, D Residual Heat Removal Pump In-Service Test, Revision 35

HC.OP-FT.EC-0001, A Fuel Pool Cooling Pump (AP211) Functional Test, Revision 10

HC.OP-SO.KJ-0001, Emergency Diesel Generators Operation, Revision 59

MA-AA-716-012, Post Maintenance Testing, Revision 16

#### Notifications

20517896      20517970      20519587      20519729      20520292      20431270

20520943      20520292

Orders

30209971      60087670      50142356      50140680      30106229      60085863  
60098267

60076802-20, Replace Bailey Modules FPC Channel A

60097527-20 & 30, 1A-P-211, Perform A Fuel Pool Cooling Pump Repairs

Drawings

10855-J-200, HPCI Alarms and Status Channel 'C', Revision 0

J-55-0, 1E Circuit Ch C, Sht. 13, Revision 0

E41-1040, HPCI System, Sht. 4 and 6, Revision 0

**Section 1R22: Surveillance Testing**

Calculations

BH-0003, Standby Liquid Control System Discharge Piping Pressure Drop and Transport Time,  
Revision 3

Completed Surveillances

HC.OP-ST.KJ-0004, Emergency Diesel Generator Operability Test, 7/25/2011

HC.OP-IS.BJ-0001, HPCI Main and Booster Pump Set - Inservice Test, 7/7/2011

HC.OP-IS.BH-0003, Standby Liquid Control Pump - Inservice Test, 9/1/2011

HC.OP-IS.BC-0003, B Residual Heat Removal Pump - Inservice Test, 9/13/2011

Notifications (\*NRC identified)

20486124      20519551\*      20525567\*

20524273\* - Calculation BH-0003 Revision Request

Orders

50142229      50140350      50141577      50142024

Drawings

M-51-1, Sheet 2, Residual Heat Removal

Other Documents

BC-0056, RHR Hydraulic Analysis, Revision 56

**Section 1EP6: Drill Evaluation**

Form EP-AA-125-1002-F01, DEP Observation Checklist, dated 8/15/2011

**Section 2RS1: Radiological Hazard Assessment and Exposure Controls**

Notifications

20521717      20523125

**Section 2RS3: In-Plant Radioactivity Control and Mitigation**Other Documents

NRP1009BD05, Inspect/Repair Respiratory Protection Equipment

NRP2007BA06, Perform Air Quality Checks non Breathing Air

TRI Air Testing, Inc. Compressed Air Certifications, dated 8/16/2011 and 2/25/2011

**Section 4OA1: Performance Indicator Verification**Procedures

LS-AA-2001, Collecting and Reporting of NRC Performance Indicator Data, Revision 11

Other Documents

LER 05000354/2010-002-00 &amp; -01, As Found Values for Safety Relief Valve Lift Setpoints

Exceed Technical Specification Allowable, event date October 25, 2010

LER 05000354/2010-003-00, RHR Shutdown Cooling Suction Relief Valve Missed Surveillance,  
event date November 01, 2010**Section 4OA2: Problem Identification and Resolution**Procedures

HC.OP-AB.HVAC-0001, HVAC, Revision 5

HC.OP-AB.ZZ-0135, Station Blackout/Loss of Offsite Power/Diesel Generator Malfunction,  
Revision 33

HC.OP-AR.GM-0001, Diesel Area HVAC Local Control Panel 1EC483, Revision 6

HC.OP-AR.KJ-0007, Diesel Generator Remote Engine Control Panel 1DC423, Revision 22

HC.OP-SO.EG-0001, Safety and Turbine Auxiliaries Cooling Water System Operation,  
Revision 44

HC.OP-SO.GM-0001, Diesel Area Ventilation System Operation, Revision 17

HC.OP-SO.KJ-0001, Emergency Diesel Generators Operation, Revision 59

OP-HC.108-115-1001, Operability Assessment and Equipment Control Program, Revision 14

LA-AA-117, Written Communications, Revision 10

LS-AA-120, Issue Identification and Screening Process, Revision 10

LS-AA-125, Corrective Action Program (CAP) Procedure, Revision 13

LS-AA-125-1001, Root Cause Evaluation Manual, Revision 8

LS-AA-125-1003, Apparent Cause Evaluation Manual, Revision 10

LS-AA-125-1004, Effectiveness Review Manual, Revision 3

CC-AA-103-1003, Owners Acceptance Review of External Configuration Change Packages,  
Revision 5

CC-AA-103-1008, Owners Acceptance Review of External Technical Products, Revision 0

CC-AA-309-101, Engineering Technical Evaluations, Revision 10

HU-AA-1212, Technical Task Risk/Rigor Assessment, Pre-Job Brief, Independent Third Party  
Review, and Post-Job Brief, Revision 5Notifications

20342506	20387049	20396464	20396985	20414523	20421297
20453919	20465716	20474590	20474691	20475343	20475367
20475383	20475450	20475576	20475721	20478844	20479702
20492576	20505982	20519190	20519905	20520319	20520452
20521128	20522799	20522810	20522851	20522973	20522975
20523012	20523527	20523532	20523533	20523534	20523535

20523536	20494454	20497959	20498038	20498858	20499124
20501558	20506195	20506384	20518067	20523094	20523099
20523860					

Orders

30110249	30131109	30150050	30150308	30161908	30210463
60059222	60091581	60091792	60091793	60091827	60092265
60096377	60098152				

Drawings

1761770, Sheet 3, Elect. Schematic Engine Control, Revision 14  
 E-0486-0, Electrical Schematic Diagram Diesel Gen. RM Recirc System Fans, Revision 12  
 H-88-0, Sheet 5, Aux. Building - Diesel Area Diesel Gen. Room Recirc. System (DRR),  
 Revision 14  
 J-105-0, Sheet 5, Logic Diagram Sequencer Fan Out, Revision 8  
 M-88-1, Aux. Building - Diesel Area Control Diagram, Revision 15

Calculations

E-9, Standby Class 1E Diesel Generator Sizing, Revision 8  
 EG-0047, Attachment 13, Single EDG Room Cooler Performance Evaluation, Revision 5

Evaluations and Laboratory Reports

70076024 (Op 010), B EDG Recirc Fan Trip and Diesel Recirculation (412) Fan Low Flow Trips  
 Apparent Cause Evaluation, dated 1/24/2008  
 70093256 (Op 018), Spurious Trips of 480 VAC MasterPact Breakers on Advance Protection  
 (AP) Technical Evaluation, dated 2/13/2009  
 70113315 (Op 030), 1B-V-412 Fan Trip and Diesel Recirculation (412) Fan Low Flow Trips  
 Equipment Apparent Cause Evaluation, dated 10/14/2010  
 70113315 (Op 120), Add Scope to 36M Diesel Recirculation Fan Inspection PMs, Revision 0  
 70113661 (Op 030), 1C-V-412 EDG Recirculation Fan Trip Equipment Apparent Cause  
 Evaluation, dated 12/21/2010  
 70113661 (Op 190), Nuclear Logistics Inc. Failure Analysis Report FA-04214166-1, dated  
 3/08/2011  
 80102292, Simulate the Closure of the 52HH 1-1T Contact of the C EDG Recirc Fan 1GV412  
 50.59 Review, Revision 0  
 80103945 (Op 010), A EDG Recirc Ventilation Fan AV412 Failed to Start Technical Evaluation,  
 dated 4/19/2011  
 C Diesel Inoperable due to C and G 412 Diesel Recirc Fan Trips Prompt Investigation,  
 Revision 0  
 TCCP No. 10-035, Jumper 52HH 1-1T Contact of the C EDG Recirc Fan 1GV412 Temporary  
 Configuration Change Package, Revision 0

Preventive Maintenance, Functional Tests, and Calibrations

30131109, Instrument Calibration Data Report, dated 6/3/2009  
 30135508, Instrument Calibration Data Report, dated 1/15/2009  
 30150050, Instrument Calibration Data Report, dated 2/9/2010  
 30150308, Instrument Calibration Data Report, dated 3/9/2010  
 30161908, Instrument Calibration Data Report, dated 6/16/2010  
 30161967, Instrument Calibration Data Report, dated 2/3/2011  
 30162280, Instrument Calibration Data Report, dated 2/4/2011



HC.IC-DC.ZZ-0057, Device/Equipment Calibration Dwyer Differential Pressure Switch Series 1600, 1800, and 1900, performed 2/6/2008, 1/28/2009, and 3/8/2011  
HC.IC-GP.ZZ-0002, Bimetal and Capillary Tube Thermometers, performed 2/6/2008, 1/28/2009, and 7/8/2009  
HC.IC-GP.ZZ-0067, General Instrument Calibration, performed 2/6/2008, 1/28/2009, and 7/8/2009  
HC.MD-GP.ZZ-0020, HVAC Cooling/Heating Unit and Coil Inspection and Cleaning, performed 2/5/2008  
HC.MD-GP.ZZ-0110, Buffalo Forge Axial Fans, Inspection, Repair and Vane Adjustment, performed 2/6/2008 and 1/28/2009

Other Documents

10855-D3.51, Design, Installation and Test Specification for Auxiliary Building, Diesel Generator Area Heating, Ventilation, and Cooling Systems for the Hope Creek Generating Station, Revision 7  
10855-M-018, Technical Specification for Standby Diesel Generators for the Hope Creek Generating Station, Revision 7  
70127326, 1A/1B-V-412 EDG Recirc Fan Breaker Trips Equipment Apparent Cause Evaluation Charter, dated 8/17/2011  
A3105, DG D Room 5304 Temp Analog Point Alarm Limits, dated 8/22/11  
Diesel Generator Room (5304, 5305, 5306 & 5307) Temperature Trend, 2/3/2011 - 8/25/2011  
Fundamentals Management System (FMS) Computer Based Tool

**Section 4OA3: Event Followup**

Procedures

HC.OP-SO.SG-0001, Seismic Instrumentation System Operation, Revision 6  
HC.OP-AB.MISC-0001, Acts of Nature, Revision 18  
OP-AA-108-111-1001, Severe Weather and Natural Disaster Guidelines, Revision 6  
NRC Incident Response Procedure 091001, Appendix I, Resident Inspectors Hurricane Response Guidance

Notifications

20522851, Earthquake, Unusual Event, Common Site  
20523222, Evaluate Triaxial Recorder Plate Data  
20522915, Procedure Needed to Evaluate Data  
20523132, Insulation Damage Found During UE Walkdown  
20522863, Replace Scratch Plates in Earthquake  
20522954, Earthquake experienced at PSEG Nuclear  
20522801, Seismic Event Observations  
20522972, Remove Seismic Record Plates  
20523123, HPCI Snubber Clamp  
20523034, DWFD Flow Rate of Rise Alarm  
20522897, Earthquake Oil Sample 1D-P-502-Mtr  
20522878, Earthquake Oil Sample 1A-P-102-Mtr  
20522942, HCU 14-51 Alarm  
20522945, HCU 22-27 Alarm  
20522947, HCU 54-31 Alarm  
20522948, HCU 54-15 Alarm  
20523178, Entered AB.MISC-01 For Hurricane Warning

20523289, Sequestering Personnel per Fatigue Rule  
 20523281, Watertight Door Seal Deflated  
 20522818, Perform Shoreline and Dike System Inspection  
 20523215, Lessons Learned from Severe Weather Prep  
 20523339, HWCI Out of Service iaw HC.OP-AB.MISC-001  
 20523386, Hydrogen Water Chemistry Alternate Path  
 20523624, Hi - Hi Strainer DP Alarm on D SSW Pump  
 20522904, Review Step H for Potential Revision  
 20523267, Hurricane Support  
 20523693, Post Hurricane Irene Lessons Learned  
 20525076, SRV Setpoint Drift Root Cause Evaluation  
 20483383, SRVs A & L Fail Setpoint Testing  
 20497937, Leakage from "R" SRV  
 20520106, HPCI Room Temperature Operability Challenge  
 20528533, New Procedure Request  
 20528532, HC.OP-SO.SG-0001 Revision Request

#### Orders

80104762, Seismic Instrumentation Response to Seismic Event on August 23, 2011  
 70115711, SRVs A & L Fail Setpoint Testing  
 70119769, Leakage from "R" SRV  
 70128407, SRV Setpoint Drift Root Cause Evaluation

#### Other Documents

PSEG Letter, LR-N11-0267, from P. Duke (PSEG) to USNRC, regarding "Work Hour Controls Before and After a Hurricane Emergency Declaration, dated August 27, 2011  
 LR-N11-0294, Licensee Event Report 2011-001 HPCI Operation Credit in UFSAR Scenario not Supported by Existing Documentation, Revision 0

### **Section 40A5: Other Activities**

#### Other Documents

ISFSI Yard Surveys, dated 1/3/2011, 2/8/2011, 2/22/2011, 3/8/2011, 4/2/2011, 6/7/2011, and 8/2/2011  
 Quarterly Hi-Storm Survey, dated 2/8/2011

### **LIST OF ACRONYMS**

ACE	Apparent Cause Evaluation
ADAMS	Agency-wide Documents Access and Management System
ALARA	As Low as Reasonably Achievable
CAP	Corrective Action Program
CF	Casual Factor
CFR	Code of Federal Regulations
CW	Circulating Water
DCP	Design Change Package
DEP	Drill and Exercise Performance

EAL	Emergency Action Level
EDG	Emergency Diesel Generator
EGM	Enforcement Guidance Memorandum
EIAC	Emergency Instrument Air Compressor
FMS	Fundamentals Management System
HPCI	High Pressure Coolant Injection
HRA	High Radiation Area
HX	Heat Exchanger
IMC	Inspection Manual Chapter
IR	Inspection Report
ISFSI	Independent Spent Fuel Storage Installation
LER	Licensee Event Report
LOOP	Loss of Offsite Power
MSHA	Mine Safety and Health Administration
NCV	Non-cited Violation
NIOSH	National Institute for Occupational Safety and Health
NOS	Nuclear Oversight
NRC	Nuclear Regulatory Commission
OE	Operating Experience
OSC	Operations Support Center
PI	Performance Indicator
PM	Preventive Maintenance
PMOC	Preventive Maintenance Oversight Committee
PSEG	Public Service Enterprise Group Nuclear LLC
RHR	Residual Heat Removal
RTP	Rated Thermal Power
RWP	Radiation Work Permit
SACS	Safety Auxiliary Cooling System
SBLOCA	Small Break Loss of Coolant Accident
SBO	Station Blackout
SCBA	Self-Contained Breathing Apparatus
SDP	Significance Determination Process
SRA	Senior Reactor Analyst
SRV	Safety Relief Valve
SSC	Structures, Systems, and Components
SSFF	Safety System Functional Failure
ST	Surveillance Testing
SW	Service Water
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate Heat Sink